## REMARKS

Claims 1 to 24 are currently pending in this application. By way of this amendment, claims 2, 3 and 6 are canceled without prejudice to the Applicants' right to file divisional applications directed to the subject matter thereof.

### I) Summary of Final Office Action

In the Final Office Action dated July 19, 2007, the Examiner has maintained the rejection of claims 1, 4, 5 and 7 to 14 as being anticipated by or obvious over U.S. Patent No. 6,245,272 (Takita), as evidenced by the Concise Encyclopedia of Polymer Science and Engineering (the "Encyclopedia"), p. 354.

With respect to claims 1, 4 and 13, the Examiner admits that Takita is silent regarding:

1) the co-monomer ratio of the high density polyethylene copolymer (HDPE-CO) and its melt index (MI);

2) the viscosity average molecular weight (Mv) of the high density polyethylene (HDPE); and

3) the Mv and co-monomer content of the blend.

However, with respect to the co-monomer ratio of the HDPE-CO and its melt index, the Examiner contends that it is well known that HDPE can be a polymer of ethylene copolymerized with propylene, as evidenced by the Encyclopedia. The Examiner maintains that selecting an HDPE-CO having a workable α-olefin content or MI as claimed is either anticipated or obvious in the practice of Takita's invention, as a person skilled in the art would be motivated to obtain a melt extrudable blend. With respect to the HDPE Mv, the Examiner alleges that the broad molecular weights taught

by Takita would inherently encompass any HDPE having the claimed Mv. With respect to the Mv and co-monomer content of the claimed blend, the Examiner again insists that such parameters would either be anticipated by Takita or would be an obvious optimization, as a person skilled in the art would be motivated to obtain an HDPE blend with beneficial properties, such as melt processibility.

With respect to claims 15 to 24, the Examiner further contends that absent any unexpected end use properties, the claims would also be anticipated or obvious by practicing the invention of Takita.

The Examiner argues that the claimed microporous polyethylene film and the membrane disclosed in Takita have the same end use, which results in Takita either anticipating the claimed microporous polyethylene film or rendering the film obvious. At page 6 of the Office Action, first full paragraph, the Examiner asserts that "there is nothing whatsoever preventing one of ordinary skill in the art to select a common HDPE comprising a workable content of α-olefin to make Takita's microporous membrane, motivated by the desire to obtain beneficiary effects provided by the propylene co-monomer. Furthermore, the Examiner contends that because Takita encompasses the "essential structure and composition of the present invention" for the same end use, the claimed ranges would be obvious to optimize.

Applicants respectfully traverse the Examiner's rejections for the reasons below.

**II) The Claims Are Not Anticipated**

Takita does not anticipate the claimed polyethylene films. In order for a reference to anticipate a claim, the reference must teach each and every aspect of the

claimed invention, either explicitly or inherently. *Merck & Co. v. Teva Pharms. USA, Inc.*, 347 F.3d 1367, 1372 (Fed. Cir. 2003). Takita does neither of these.

**A) The Claims Are Not Expressly Anticipated**

Takita's invention relates to a microporous polyolefin membrane for use as a battery separator. *See* Office Action, page 2, paragraph 4. However, as admitted by the Examiner, Takita is silent with respect to:

1) the co-monomer ratio of HDPE-CO and its MI;

2) the Mv of the HDPE; and

3) the Mv and co-monomer content of the blend.

Accordingly, Takita does not expressly disclose each and every aspect of the claimed polyethylene films and does not explicitly anticipate the claimed polyethylene films.

**B) The Claims Are Not Inherently Anticipated**

The claimed polyethylene films are also not inherently disclosed by Takita. If a reference does not expressly disclose all of the limitations of a claimed invention, the reference can only inherently anticipate the invention if the missing descriptive matter is *necessarily present* in the referenced art. The case of *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1268, (Fed. Cir. 1991) is illustrative.

> To serve as an anticipation when the reference is silent about the asserted inherent characteristic, such gap in the reference may be filled with recourse to extrinsic evidence. Such evidence must make clear that the missing descriptive matter is <u>necessarily present</u> in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. (emphasis added)

In the present case, the Examiner has *failed* to show that all of the claim limitations of claim 1 are *necessarily present* in the compounds disclosed by Takita, or that persons skilled in the art would so recognize. The Examiner seeks to rely on the

Encyclopedia as evidence that propylene is commonly copolymerized with ethylene to form HDPE. However, the Encyclopedia fails to provide any evidence of the admittedly absent elements of claim 1.

Evidence that the claimed polyethylene films are not inherently disclosed by Takita is provided, for example, in Example 1 and Comparative Examples 3 and 4, which are discussed at pages 29, 30, 34 and 35 of the specification, and summarized in Table 1 at pages 37 to 40. For ease of reference, selected portions of Table 1 have been reproduced below. Nonetheless, the Examiner is encouraged to carefully study those portions of the specification identified above.

| **Composition** | | **Example 1** | **Comparative Example 3** | **Comparative Example 4** |
|---|---|---|---|---|
| Copolymerized linear high density PE1 | MI 0.8<br>Comonomer 0.6% | 30 | | |
| Copolymerized linear low density PE | MI 0.3<br>Comonomer 1.3% | | 30 | |
| High Density PE2 | Mv 150,000 | | | 30 |
| High Density PE3 | Mv 300,000 | 30 | 40 | 40 |
| High Density PE5 | Mv 700,000 | 15 | | |
| Ultrahigh Molecular Weight PE1 | Mv 2,000,000 | 25 | 30 | 30 |
| Air Permeability (sec) | | 400 | 650 | 390 |
| Film Rupture Temperature (°C) | | 157 | 145 | 150 |
| Shrinkage Force (N, at 150°C) | | 0.5 | Membrane ruptured | Membrane ruptured |
| Shrinkage Stress (kPa at 150°C) | | 99 | - | - |
| Battery Evaluation | | No exothermic reaction | No exothermic reaction | Exothermic reaction |

Comparative Example 4 comprises 30% high density PE2, 40% high density PE3, and 30% ultrahigh molecular weight PE1. This polyethylene blend comprises no

copolymer units and is therefore not encompassed within claim 1. However, this polyethylene blend falls within the polyethylene films taught by Takita. *See* col. 3, lines 8 to 13. According to Table 1 (data reproduced above), this membrane has inferior qualities compared to polyethylene films with the claimed parameters (*see*, for example, Example 1). Notably, the polyethylene film of Comparative Example 4 ruptured in the shrinkage force test and failed to prevent exothermic reactions in the test battery.

Even if the polyethylene film comprises a comonomer unit, this does not necessarily result in desirable characteristics in a polyethylene film. For example, the polyethylene film of Comparative Example 3 comprises 30% copolymerized linear low density PE having an MI of 0.3 and comonomer content of 1.3%, 40% high density PE3, and 30% ultrahigh molecular weight PE1. This film also is believed to fall broadly within the teachings of Takita. However, this composition does not come within claim 1 because it comprises a comonomer content greater than 1.0% by mole. As shown in Table 1 (data reproduced above), the physical characteristics of this composition are also inferior to those of Example 1. Although the polyethylene film of Comparative Example 3 is able to prevent the exothermic reaction in the test battery, it has a low film rupture temperature, poor air permeability, and the membrane also ruptured in the shrinkage force test.

In contrast, the film of Example 1, which illustrates an embodiment of the claimed polyethylene films, comprises 30% copolymerized linear high density polyethylene having 0.6% comonomer with an MI of 0.8, 30% high density PE3, 15% high density PE5, and 25% ultrahigh molecular weight PE1. The film of Example 1 has superior qualities over the films of Comparative Examples 3 and 4. For example, the film of

Example 1 has a high film rupture temperature of 157°C, superior shrinkage force and shrinkage stress qualities, and it prevented exothermic reactions in test batteries.

These examples illustrate that Takita does not inherently anticipate the claimed polyethylene films because the claimed films and their properties are not necessarily present in the films generally taught by Takita.

**C) A Species Is Not Anticipated By Its Genus**

If a prior art reference merely describes a broad genus but does not *specifically* describe a later-claimed species, the prior art reference does not anticipate the claimed species, even if the genus encompasses the species. *See Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 999 (Fed. Cir. 2006). Takita does not anticipate or render obvious Applicants' claimed microporous polyethylene films.

Takita merely discloses a broad genus of polyolefin microporous films. However, Takita does not disclose or suggest the claimed polyethylene film or even, generally, polyolefin films having the balance of specific flowability, density, mechanical strength, permeability, and heat resistance possessed by the polyethylene films that Applicants disclose. *See*, for example, page 5, line 21 to page 6, line 3 of the specification.

The broad genus disclosed by Takita encompasses a very large number of molecules, and Takita does not provide sufficient specificity to put one skilled in the art in possession of the specific invention claimed by Applicants. At page 2 of the Office Action, the Examiner specifically relies upon preferred embodiments of Takita, discussed at col. 2, lines 48 to 67, and col. 3, lines 1 to 28. One such preferred embodiment comprises a blend B comprising:

1) an ultra-high-molecular polyolefin B-1 having a weight-average molecular weight of $1.5X10^6$ to $15X10^6$; and

2) a polyolefin B-2 having a weight-average molecular weight of $1X10^4$ to $1X10^6$.

Preferably, the blend B contains 15 to 40 weight % of B-1. Takita discusses generally at col. 3, lines 1 to 27, that the polyolefins include homopolymers, two-stage polymers, or copolymers of various types. Preferable copolymers include polypropylene and polyethylene, and polyethylene may be of high, low, or medium density.

Not only are the teachings of Takita very general, but the range of molecules encompassed within the preferred embodiments of Takita is very large. For example, B-1 includes molecules having a 10-fold difference in weight-average molecular weight. B-2 includes molecules having a 100-fold weight difference. These two parameters alone result in at least 1000 possible weight combinations. Further, the ratio between B-1 to B-2 in the blend preferably ranges from 15:85 to 40:60, which produces at least 25 different blend ratios. This additional parameter results in at least 25,000 different possible polyolefin blend combinations. Finally, Takita's disclosure of a large number of copolymer molecules, including ethylene, propylene, 1-butene, 4-methyl-pentene-1, 1-hexene, 1-octene, vinyl acetate, methyl methacrylate, styrene, or blends thereof, when factored into the already significant number of polyolefin blends (i.e. 25,000), creates a scenario where, at a minimum, there are millions of possible polyethylene film blends.

According to the court in *Impax Laboratories, Inc. v. Aventis Pharmaceuticals, Inc.*, 468 F.3d 1366, 1383 (Fed. Cir. 2006), a genus does not anticipate a species unless each member of the genus can be *immediately envisaged* by a person of skill in the art.

> When a reference discloses a class of compounds, i.e., a genus, a person of ordinary skill in the art should be able to "at once envisage each member of th[e]...class" for the individual compounds, i.e., species, to be enabled [for the purposes of anticipation]. If the members cannot be envisioned, the reference does not disclose the species and the reference is not enabling (emphasis added).

Applying this case to Takita, due to the very large number of polyolefin films that Takita potentially discloses, it would not be possible for persons of skill in the art to envisage all of these films or to specifically envisage the claimed polyethylene films from the millions of possible films taught by Takita.

The shortcomings of Takita are self-evident when measured against the vast number of polyolefin films potentially covered by Takita's disclosure. For example, Takita does not provide any guidance that would lead a person skilled in the art to select Applicants' claimed polyethylene blends from the *millions* of possibilities disclosed by Takita. As admitted by the Examiner, Takita is silent with respect to the co-monomer ratio of the HDPE-CO, the MI of the HDPE-CO, the Mv of the HDPE, as well as the Mv and co-monomer content of the claimed polyethylene blend. Without some specific guidance, which Takita does not provide, persons skilled in the art would never arrive at the claimed microporous film without undue and excessive experimentation.

**D) Takita Does Not Sufficiently Describe the Claimed Polyethylene Films**

According to *Minnesota Mining and Manufacturing Co. v. Johnson & Johnson Orthopaedics*, 976 F.2d 1559 at 1572 (Fed. Cir. 1992) ("*3M*"), if a general description of a prior art product does not sufficiently describe a claimed invention, the claimed invention is not anticipated by the prior art. Specifically in *3M*, the court stated:

> The Master recognized that although Garwood's specific claims are subsumed in Straube's generalized disclosure of knit fiberglass as a substrate, this is not literal identity....
>
> In order to anticipate, the Straube patent must sufficiently describe the claimed invention to have placed the public in possession of it. The record establishes that the Straube patent does not do this. It merely states in a very general way that fiberglass can be used as a substrate. However, neither the information provided in the Straube patent nor 3M's interpretation thereof are exact enough to identify the ranges claimed in Garwood (emphasis added).
>
> *Id.* at 1572

Much like the Straube patent in the *3M* case, Takita does not sufficiently describe Applicants' claimed invention and therefore does not anticipate it. Takita merely states that polyolefin membranes are useful as battery separator membranes. "Incorporation of polypropylene can improve melt-down temperature and as a result, characteristics of the membrane for battery separators can be improved." Col. 3, lines 26 to 28. However, this is nothing more than a recognition that HDPE copolymers can have improved properties. However, this generalized teaching in Takita provides little or no guidance for achieving the claimed properties (viz. claims 7-12) by the claimed polyethylene film blend.

By way of example only, as discussed in the specification at page 3, lines 2 to 18, it is important that battery separators have excellent film rupture resistance *and* low heat shrinkability, which are characteristics of heat resistance. However, the specification further discusses at page 3, line 19 to page 5, line 18 the problems encountered with previous microporous membranes, namely their inability to address both fuse effect *and* heat resistance while maintaining mechanical strength and permeability. Accordingly, obtaining a polyethylene film with a balance of fuse effect,

heat resistance, mechanical strength, and permeability is not simply a matter of routine experimentation as the Examiner contends.

Nothing in Takita addresses these issues or even recognizes that such issues exist with microporous battery membranes. The Examiner contends, without any evidence of such, that Applicants' claimed elements and properties would either be anticipated by Takita or an obvious optimization of Takita, because a person skilled in the art would be motivated to obtain an HDPE blend with beneficial properties, such as melt processibility. However, the desireability of obtaining a certain result does not teach a person skilled in the art how to obtain that result, and Takita simply does not teach a person skilled in the art how to arrive at the claimed invention. Given the millions of possible polyolefin blend combinations that Takita discloses, a person skilled in the art could not arrive at Applicants' claimed polyethylene films. Takita does not place the public in possession of the claimed invention. *3M, supra.* Therefore, Takita does not anticipate the claimed polyethylene films.

For the above reasons, Applicants submit that claims 1, 4, 5, and 7-24 are not anticipated by Takita and/or the Encyclopedia.

**III) The Claims Are Not Obvious**

The claimed microporous polyethylene films are also non-obvious over Takita, either separately or in combination with the Encyclopedia. The U.S. Supreme Court recently affirmed that the factual inquiries outlined in *Graham v. John Deere Co.*, 383 U.S. 1 (1966) provide the proper framework for establishing the underlying facts in a case of obviousness. *See KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1734

(2007). In the present case, the Examiner has failed to make a *prima facie* showing of obviousness in accordance with *Graham v. John Deere Co., supra*.

At page 5, paragraph 5, of the Office Action, the Examiner contends that the rejection under 102(b)/103(a) is appropriate because "the prior art discloses all the essential structure and composition limitations, except certain specific properties or functions, which are deemed to be dictated by the same end use." At page 6, last paragraph of the Office Action, the Examiner further argues that:

> since Takita's teachings encompass the essential structure and composition of the present invention, and they are for the same end use, workable ranges of various properties or functions are deemed to be obvious routine optimization to one skilled in the art of battery separator[s]. The Examples are illustration that useful end products can be obtained by routine experimentations within the general disclosure of Takita. (Emphasis added.)

The Examiner's conclusions are erroneous and improper as demonstrated below.

First, Takita, either by itself or in combination with the Encyclopedia, does not disclose all of the "essential structure and composition limitations" of claim 1 as the Examiner alleges. Nowhere does Takita mention that HDPE copolymers are preferable. In addition, there is no mention of α-olefin content, MI of the copolymer, Mv limits, or the advantages that such parameters provide. These deficiencies are not supplied by or taught in the Encyclopedia, which discloses that HDPE can be a polymer of ethylene copolymerized with propylene.

Second, while the Examiner asserts that workable ranges of the claimed polyethylene films would be "obvious routine optimization" to one skilled in the art, the Examiner has failed to provide any evidence (other than pure speculation) for this conclusion. The obviousness rejection is improper.

According to the Court in *KSR,* "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR,* 127 S.Ct. at 1739. The Examiner contends at page 6, first full paragraph, of the Office Action that "there is nothing whatsoever preventing one of ordinary skill in the art to select a common HDPE comprising a workable content of propylene (α-olefin) to make Takita's microporous membrane, motivated by the desire to obtain the beneficiary effects provided by the propylene co-monomer." However, whatever these "beneficiary effects" of propylene co-monomer may be, there is no evidence that one skilled in the art would ever arrive at the claimed invention. Where, as here, there are millions of possibilities suggested by the asserted prior art, there is no basis to argue, as suggested by the Examiner, that the result is predictable. *KSR,* 127 S.Ct. at 1739. There must be a reasonable expectation that altering a prior art compound to obtain the claimed compound would produce a predictable result. *Id.*

The claims at issue here recite more than just utilitizing a co-monomer such as propylene. They recite many additional elements or properties not addressed by Takita or the Encyclopedia when viewed by one skilled in the art. The millions of possibilities suggested by the prior art do not produce a predictable result, or provide the missing elements or properties. To the contrary, it is just the opposite.

In the present case, neither Takita nor the Encyclopedia provide a person of ordinary skill in the art with any "reason" to optimize the elements or properties claimed in the claimed polyethylene, or teach how the proper selection of such parameters would result in a product with superior qualities over prior art products. *Id.* at 1741. The Examiner, for his part, is relying entirely and improperly on speculative hindsight based on the claimed invention.

In addition, the Examiner has failed to demonstrate "any design need or market pressure to solve a problem [where]...there are a finite number of identified, predictable solutions." *Id.* at 1742. As explained, Takita's disclosure presents the skilled artisan with potentially millions of possibilities. As demonstrated above, a representative cross-section of those possibilities fall outside the claimed invention. Simply stated, the claimed invention would not have been obvious to one skilled in the art over Takita.

Moreover, for optimization of a parameter to be obvious, the prior art must recognize that the parameter is a result-effective variable. *In re Antonie*, 559 F.2d 618, 620 (C.C.P.A. 1977) and MPEP 2144.05(II)(B). The Examiner has failed to articulate why anything in Takita or the Encyclopedia teaches or suggests that the claimed elements and/or properties of the polyethylene film of claim 1 are recognized as result-effective. In particular, neither Takita nor the Encyclopedia disclose any beneficial effects of controlling the specific HDPE-CO content, melt indices of the HDPE-CO, and viscosity average molecular weight ranges of the HDPE-CO and the polyethylene blend.

Furthermore, the Encyclopedia fails to overcome the shortcomings of Takita. For example, it fails to provide any additional guidance over Takita. The Encyclopedia merely discloses that polyethylene may be copolymerized with α-olefins, such as propylene, 1-butene, and 1-hexene. The Encyclopedia does not disclose that any one α-olefin copolymer may have particular advantages over others, that a particular α-olefin might contribute different characteristics to a polyethylene molecule over the others, or that different ratios of α-olefins in a polyethylene molecule have different effects on the molecule. Accordingly, the Encyclopedia does not assist Takita in any way in teaching the claimed polyethylene films.

The Examiner has provided no reasoning, motivation or rationale for a person skilled in the art to produce the claimed polyethylene films with the recited properties. Accordingly, the claimed polyethylene films are not obvious in light of Takita and/or the Encyclopedia.

**IV) Summary**

For all the above reasons, the claims are neither anticipated by nor obvious in view of Takita and the Encyclopedia. Applicants respectfully request allowance of the claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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